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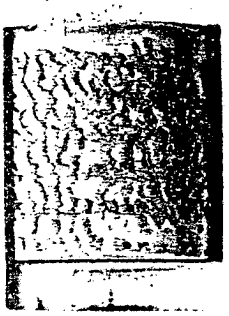

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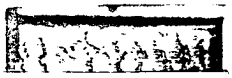

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# THE CASE FOR PLANNING

Planning is a great untapped resource in office systems management. While all pay homage to it, few actually practice it. Reactive management is survival behavior, taught by years of organizational fire fighting. As management repeatedly focuses its attention to respond to the compelling demands of issues which require immediate attention, organizational myopia results. Planning receives relatively low priority.

There is an additional deterrent to planning in the information arena: the only industry constant is change. Planning is frustratingly complex in an environment which is evolving so rapidly that it denies the illusion of certainty. As a result, there are two radical poles of thought on office automation planning: either WAIT until the "perfect" system is available, or BUY ANYTHING to avoid missing the parade. In between is a continuum, in which a balance may be found in cautious evolution.

Office information systems have become the focal point of ever-increasing organizational resources in the past five years. By the year 1990, 85% of all clerical and secretarial personnel in the U.S. will be using a terminal to facilitate their work. And the number of technical, professional, managerial and executive individuals using personal computers, decision support systems, and specific application programs grows daily.

Managing the burgeoning population of office information systems requires greater organizational expertise, more technical knowledge and industry perspective, and better planning, with a shorter learning curve, than any other challenge which has faced corporations and government agencies to date.

Planning is key to good systems management. A strategic plan for office systems addresses the user population and its needs, defines the parameters of the desired systems, sets a timetable for assessment and installation, facilitates vendor negotiations and contracting, and establishes benchmarks to track progress. In brief, a strategic plan is a reasonable course of action, serving as a "road map" which may ultimately show one where one has been better than where one is going, but without which it is extremely difficult to chart a course.

# PLANNING ISSUES

ORGANIZATIONAL PRIORITIES: Organizational information strategy is linked with the organizational business strategy. Thorough understanding of the business objectives of any organization is the first step in the planning process. Beyond having a general feeling about business priorities and objectives, it is good practice to formalize those priorities by committing them to paper. The simple act of putting organizational objectives in writing takes one a large step toward assuring that those objectives will be met.

Due to its evolutionary nature, office automation can change status within the organization from a support operation to an operation of strategic value in terms of organizational survival and success. In the insurance and banking industries, for example, advanced technological implementation is no longer a matter of choice. It is a matter of survival, and a measure of the ability to compete within those industries.

ORGANIZATIONAL CLIMATE: Organizational culture, politics, and individual strategy ultimately define the parameters within which an advanced office plan will both succeed and fail. Understanding the personal priorities of the individual steering the planning process is also important. Either as the planning leader or as a member of the planning team, it is important to recognize that an advanced office plan designed by an individual whose career goal is to be appointed chief financial officer will look markedly different from the advanced office plan of an individual whose career objective is to be director of strategic planning.

PLANNING OBJECTIVES: Whether the planning group is run as a democracy or as an enlightened dictatorship, the group should go through the process of establishing a finite set of planning objectives. Objectives come in different flavors, from the desire to create a showcase "office of the future" to the need to find more economical and effective methods of providing the services which form the structure within which the larger organizational goals can be addressed. Again, the seemingly unimportant act of putting planning objectives on paper validates them. It is paramount that one knows where one wants to go before beginning the process of assessing alternative routes. Objectives are not brittle entities. Once established, it is perfectly acceptable to recognize that along the way to achieving a goal, new objectives have appeared, or that the pot of gold appears to have shifted as you approach it.

INFORMATION IMPACT: Assessing information impact on service levels and organizational performance is an attempt to define what the result of the plan will look like, and feel like, within the organization. Picture the result you are after, and if that vision has the look you want and matches the environment of the organization, then proceed. At the highest levels of information use, such a projection may not be feasible. Also, there are hazards associated with succeeding with an advanced office plan. Improved support systems invariably lead to increased demand for additional services.

SUPPORT NEEDS: Understanding that the kind of work performed and work flow at all levels of personnel will be affected by a new system is an important step in designing systems which will improve organizational effectiveness, particularly at routine function levels (clerical and secretarial). This is a labor-intensive step, and it is sometimes useful to employ outside "experts" and tried data collection techniques. Since there are universities and consulting companies filled with people who spend their lives perfecting the collection of valid statistical information, there is no reason or benefit to be gained from spending the time and effort to reinvent the wheel. Use of outside consultants is a "cultural" matter: some organizations trust outsiders, others do not.

ORGANIZATIONAL INFORMATION FLOW: Information industry consultants are fond of asking audiences what they expect to achieve by automating a paperwork jungle. The answer, of course, is a bigger, faster mess. The contemplation or undertaking of an advanced office planning exercise, presupposes the belief that it is possible to improve the working environment: that providing better, faster information makes possible better, more timely, business processes. Knowing what information is needed, by whom and when, is essential to limiting the possibility that an advanced office installation will turn current information problems into monsters.

Again, the process of understanding information flow breaks down at the higher application levels, where even an executive cannot verbalize a list of the types of information which he/she needs to make decisions. At this level, and to the extent that each knowledge worker engages in some of this level activity, understanding information needs and flow would be tantamount to mapping the processes of an individual's mind.

PERSONNEL IMPACT: Despite the finest planning and the most elaborate technology, it is ultimately the individuals who will use (or not use) the advanced office system who control and measure its success. Selection of the pilot environment, or the first groups to receive new technology, has impact on how complex systems are received. There are many selection criteria:

- People already comfortable with advanced technology will tend to adjust to new systems more easily than the computer illiterate.
- Organizational visibility, installing in the CEO's office early for example, may and may not be advantageous.
- Individuals with the greatest need, may and may not provide the most receptive environment in which to begin.

The list of alternatives will be based on specific organizational priority issues and culture. Many enthusiastic planners have learned that over-selling the benefits of a technology can be the "kiss of death" for an installation. Pre-selling the user population and adequate training and support are the precautions which leverage your investment in the plan.

TARGET APPLICATIONS: Although many applications are available off-the-shelf, office systems are sufficiently immature that industryspecific applica-

tions are likely not to match organizational needs exactly, and at the very least may require tuning. The applications which the planning team targets are inextricably bound to the goals of the advanced office project and the needs of the individuals who will be using the system.

AVAILABLE TECHNOLOGIES: An advanced office is a flexible entity, which allows for the idiosyncracies of each environment much as a chameleon adapts to foliage. The fact that there is no one static advanced office system is an advantage. An advanced office may include a variety of technologies in a configuration which suits the individual organizational climate, priorities, and desired results. A discussion of the capabilities of individual technologies follows later in this document.

THE OPTIMUM SYSTEM: Attempting to define an "optimum system" is a worthwhile exercise. Whether or not it is realistic is another matter entirely. With an understanding of the organizational culture and climate, a sense of organizational information impact, knowledge of the types of work and applications and individuals targeted, planning objectives, and a true grit, one is prepared to join the quest for an advanced office system.

IMPLEMENTATION SCHEDULE: It is useful to specify the phases of organizational study, technology assessment, system recommendation and approval, acquisition, implementation, training, monitoring, and project assessment. Without such a schedule, the temptation would be to plan forever.

THE ADVANCED OFFICE TEAM: The plan itself is not the goal, of course. Implementation of a successful system is the goal. There is no advanced office system success without the team which gathers information, assesses the data, prioritizes, configures the system, disseminates information within the organization, selects the equipment, negotiates with vendors, manages the installation, supports the users, and reviews the accomplishments of the project. Nor is there any advanced office system success for a large scale implementation without strong corporate support from the executive level, from finance, from the affected departments, and ultimately from the users of the system.

PROJECT REVIEW: In order to evaluate the success of the plan and to build momentum for future projects, reviewing the effectiveness of the project is the essential final step in the planning process. Project review is also the first step in the next planning cycle. Success in advanced office systems planning, as in life, is a journey rather than a destination.

# COST/BENEFIT ANALYSIS

Cost/benefit analysis carries a stigma of being the hammer of finance and the bane of forward-thinking systems planners. Although not entirely undeserved, such prejudice gets in the way of the real issues. Every organizational action, like every other human activity, has a dual nature: positive and negative ramifications, costs and benefits. Like yin/yang in oriental philosophy, neither element exists without its counterpart.

It is a business reality that one must invest in order to leverage resources, in order to increase profitability. And in order to make educated investment decisions, the costs and benefits of any investment should be measured and weighed. In the early days of data processing, cost/benefit analysis was relatively straightforward and simple:

- $X of computing power could accomplish the work of $Y of clerical employee power, in less time and with fewer errors.

Early office automation justification was an equation of the same order:

- $X of word processing equipment plus Y-2 typists produced more pages of higher quality, with two less employee benefit packages, than the original Y number of typists could produce on standard typewriters.

Those were the "good old days." Now it is more difficult to figure which costs it makes sense to cut, or what benefits are directly related to the purchase of a system. Ours is no longer a traditional, flat view of human capability and system potential. It is no longer only the static tasks which we seek to enhance. Suddenly, systems potential impacts such high level, subjective and personal activities as planning and decision making. How and when does one know that an executive decision has been a good one, let alone how it should be measured? The issue is no longer simply the cost/benefit analysis of the past. The issue of value assessment stretches us beyond the boundaries of limited systems and prior experience.

# PRODUCTIVITY ASSESSMENT

Analyzing organizational value is one of the most difficult activities which an individual can undertake. Although "productivity" and "effectiveness" do not produce or sell the next widget, this is the stuff company futures are made of.

At the MIT Center for Productivity Research, Dr. Michael B. Packer divides the spectrum of economic activities into the following three levels:

1. Structured or repetitive tasks like filing

2. Semi-structured work like operations planning

3. One-of-a-kind unstructured activities which require such intangibles as judgment and instinct.

It is primarily those who engage in the third set, the "knowledge workers," for whom we will ultimately plan and implement advanced office systems. These are the individuals who create, design, direct, and analyze. The work they perform is generally unstructured, requires judgment, is non-repetitive. Tasks per se are difficult to specify. Unforeseen results are often important. Time lags may occur between actions and outcomes. Their work is multidimensional, having many aspects which may be important simultaneously. Judgments about the results of their endeavors may depend entirely upon the point of view of the observer.

This is the sort of hay which fuels old efficiency experts' nightmares. But Dr. Packer is one expert in the area of productivity assessment who disbelieves the "myth" that such activities cannot be measured. Some of the standard techniques for evaluating effectiveness follow.

Time Expenditure Analysis: A statistical sampling and categorization of how people spend their time. This technique is a fairly weak surrogate for dealing with weightier issues like goals and responsibilities. Its popularity is due to the fact that it gives you something easy to measure, whether or not it is in fact what should be measured.

Time and Motion Study: Breakdown of individual motions or actions to establish time standards for tasks. Like time expenditure analysis, this method of work measurement is inappropriate to the knowledge worker environment.

Communication Flow Analysis: Monitoring of all flows of information by source, recipient, and type of information transferred. This method is useful for planning information systems.

Statistical Quality Control: Statistical analysis of data about a repeated operation to determine whether the process is "under control" and to suggest possibilities for improvement. Since the activities of the "knowledge

Suggestion of a set of tools that may help in defining agency-wide requirements systematically.

worker" have been defined as containing few repetitive processes, this method has limited applicability here.

Office Procedure Flowcharting: Rationalization of common office procedures through study of initiation, management, and termination rules for each procedure. This method represents the extension of computer flow-charting into the semi-structured areas of the work environment. Again, the method can lead the measurer astray. Here is a measure of activity today, not an indication of what the subject should be doing.

Value Analysis: Examines cost of each task and its contribution to the overall value of goods or services.

Transfer Pricing: Market-based approach to evaluating the worth of a service: how much are people willing to pay for that service?

Gut Feel. Despite the hazards of bias and the difficulty of communicating a "feeling" to others, instinct is your best way to know when a decision or activity is right. Finance, however, may be unreceptive about signing an invoice on this basis, despite the fact that this is what managers actually do.

There are a variety of evaluation methods which get at the real object to be measured, in this case the potential benefits and impact of advanced office equipment. The most sophisticated of these methods draw on techniques from such fields as educational testing, psychological testing, and market research to develop reliable measures of the intangible benefits of advanced office equipment.

In the area of measuring intangibles, some organizations prefer to rely on outside consultants who have the advantage of being "experts" in their field, having an objective perspective on the organization, and adding a credibility factor to the measuring process. The disadvantage of the outside consultant is the length of the learning curve to understanding the particular organization and its culture.

When working with consultants, it is the responsibility of the hiring parties to familiarize that consultant with the particular organization. This is a mutual education process which is essential to getting the results you desire. Understanding the organizational culture is of paramount importance. The group experience with new technologies, resistance to change, relations with outside organizations, even prior experience with consultants is valuable information. Don't look now, but the moment you accepted responsibility for an advanced office project you, too, became a consultant.

The two big questions in productivity measurement, or cost/benefit analysis if you prefer, are:

- Knowing what you really want to measure, and
- Figuring how it can be quantified.

The variety of organizational goals on which to found productivity measurement are almost limitless:

- Pure Efficiency
- Financial Performance
- Product or Service Quality
- Planning and Goal-Setting Effectiveness
- Information Management
- Internal Control
- Competitive Position and Reputation
- Organizational Adaptability
- Human Resource Development
- Morale and Teamwork
- Organizational Growth
- Innovation and Creativity

With a little effort, you can indeed evaluate "warm fuzzy" goals to the satisfaction of corporate finance. Here is a great opportunity to exercise your creative instincts and your intuitive understanding of the organization. If inspiration is in short supply, there are individuals in the consulting world who can be called upon to help. IDC is aware of approximately 50 large organizations which have used such consulting services.

We are no longer relegated to justifying human effort on the level of a "line count." Value is a composite of such factors as:

- The overall information strategy of the organization.
- Information security and integrity.
- The competitive advantage made possible by the use of new technology.
- Enhanced interfaces among individuals, management groups, divisions, and organizations.
- Control of information.

Indicators of value may come from such diverse areas as employee response, interaction between operational groups, accuracy and timeliness of information, changes in working procedures and relationships, and group morale.

With personal computers popping up like spring flowers, it will not be long before organizations make the quantum leap to assuming that advanced office systems are as necessary as typewriters and telephones.

# TECHNOLOGY ISSUES

This segment addresses the technologies which are both the "form of" and "delivery mechanism for" the advanced office. The issues of communications, relating to the overall organizational structural concerns of an advanced office plan, are given major emphasis. The specific technologies discussed include:

- Communications
- Software
- Word Processing
- Text Storage and Retrieval
- Micrographics
- Graphics
- Electronic Mail & Voice Mail
- Teleconferencing
- Personal Computing

Planning for the office requires a working knowledge of each of these technologies, and more. The intention here is to touch on the gamut of existing technologies, from which the planner selects for the portfolio of applications to be developed on a priority basis. Communications is treated in greater depth due to the scope of the issues and increasing importance in planning for advanced office systems.

# COMMUNICATIONS

A remarkable transformation in thinking has occurred in the heads of organizational planners during the past two years. There has been a total elevation of communications awareness among individuals and organizations from the novice system user to the computer sophisticate. Concurrently, our society has been swept up into the milieux of communication. Networks number among the "megatrends" of our daily life. Personal networks, resource networks, and information networks surround and support us. And at the organizational level, there is hardly a systems planner today, regardless of system size, who does not place communications strategy high on the priority list.

It is eminently clear that systems can no longer be viewed as stable entities. They expand at an astounding rate which is the result of a combination of such odd allies as chip technology, high-level software flexibility, eloquent information management techniques (Information Center), and insatiable user demand. As systems expand, and their power and domain increase, communications is the bridge from office to office, department to department, division to division, organization to organization, and along the diagonal between any of those layers. The technology which is the key to making any growing system viable long-term (longer than six months) is communications.

After the Ethernet announcement (September 8, 1980), there were two years of industry arm wrestling over which would become the ultimate communication standard: baseband vs. broadband. Now that argument is purely academic. The user population has come to realize that there are positive and negative aspects of each, and there are also other options to be considered: PBX, IBM's token ring alternative, fiber optics, and microwave. What is essential to effective planning is matching the technology and the media of delivery with unique organizational needs and environmental variables. Communication is no longer an intramural sport. Communication is a necessity of life and the best configured communication architectures are going to make use of multiple network technologies.

There are two poles of thought about networks, one view positing that modern information networks are as old as the first functional PBX and the other that electronic networks were born on September 8, 1980. Other networks did exist in between, notably ALOHA in the late 1960s and Arpanet in the late 1960s to early 1970s. But the issue is not the dating of the technology, rather it is the recognition that we all, users and vendors alike, are very new at managing communications technology. The learning curve is high, and there is plenty of room for error.

Early communication theory, like old system theory, posited a finite universe governed by a central controller (host) managing a community of unintelligent users: teletype, CRTs, etc. There was not much sense in planning for communication between "dumb" terminals, and the technology and architecture supported the "dumb" terminal theory. (Remember the vintage science fiction movie, "The Planet of the Apes"?) Over the years, the end user has become increasingly more knowledgeable about information technologies. The need for

additional capability, communications, and autonomy has evolved rapidly. This demand for new communication structures to support user needs, in turn, is driving modern network technology.

For the sake of definition, the world of communications users can be divided into two groups: small offices and large organizations. The requirements of each of these groups is flavored by the types of communications which take place. In the small office, localized communications are emphasized with an emerging trend toward providing individual applications solutions via clusters of personal computers (PCs) accessing a variety of shared peripherals. (Corvus and Nestar have found their niche by providing systems for this marketplace.) The small office also provides a potential market for the integration of voice technology into the total system scheme, due to the fact that small offices are not inhibited by a large investment in a costly PBX architecture. Large organizations, by contrast, are more bound by previous purchases and locked into technologies which have the double result of having provided good service for years, but making changes to newer, more flexible, systems difficult. The large organization is characterized by more general and wider ranging requirements than the small office environment.

A general list of communications systems requirements, as identified by Dr. Charlie Bass (vice president, Ungermann-Bass, Inc.), a leading expert in the network field, reads as follows:

- A communications network should be FLEXIBLE. Flexibility means that the network is, to some extent, expandable and changeable to allow for both present and future organizational requirements.
- A communications network should be COST EFFECTIVE THROUGHOUT, but particularly at the cost-sensitive low end.
- A communications network should be POWERFUL to permit such overhead-intensive operations as protocol translation and file conversion.
- A communications network should have VERY HIGH RELIABILITY.
- A communications network should ADHERE TO INDUSTRY STANDARDS. This point is essential to wide-scale acceptance, and therefore to wide-scale applicability.

At present, the integration of data, voice, and video in the local area communications market is limited, but we can expect to see the areas of intersection increase in the future.

There are very good reasons why these technologies have not been further integrated to date, beyond the observation that most organizations are not geared to take advantage of true hybrid communications. The requirements for voice and data have traditionally been different from each other. Voice communication requires rapid response times, but is very forgiving in terms of error rates. We can functionally lose a good deal of the voice signal itself and still recreate intelligible information on the receiving end. Data, on

the other hand, is very different. What is critical to data transmission is that there must be very few errors, but response time for data transmission is not a particularly critical factor. Terminals and other data sources can be polled in a variety of ways. Computer communication occurs in bursts, while video traffic is a continuous analogue phenomenon requiring high bandwidth. This comparison casts a cloud of doubt over PBX vendors who promise to deliver total communications capability over two sets of twisted pair. LAN

The first order planning issue for all systems is the practical one: what kind of cable should you pull? The answer is equally practical: "Machs Nix." (Regardless of what you put in now, you can bet that within the next two to five years you will need to put in something else.) IDC's advice on this issue echos the bottom line of the IBM book, Wiring Decisions for Building Planners: INSTALL LARGE CONDUIT. new building

The question of designing a communications architecture has three levels of issues: the large organization philosophical one, the technical issues (baseband vs. broadband, CSMA/CD vs. token passing, rings vs. busses vs. stars), and the media issues (twisted pair vs. coaxial cable vs. fiber optics vs. radio waves and/or infra-red microwave). The organizational issues are unique to the nature and character of each particular organization. The media issues, however, are relatively straightforward. Each medium has its advantages and applicability depending on the requirements of the system and the logistics of size and location of the network.

Twisted pair is the medium we are all familiar with. The central argument for twisted pair generally centers around the fact that it is a medium we all know and love. It has known problems: twisted pair plants are a bit difficult to manage and difficult to maintain, however, there are techniques developed to handle these problems. Twisted pair spaghetti is often a fire hazard, and although most independent phone companies are required to use teflon coated wires, in many states the Bell system phone companies have been exempted from this wiring code. Ceiling collapse due to the cumulative weight of copper wire is a problem of which most building planners are acutely aware. And transmission rates for twisted pair are rising in some of its forms. Mixed data and voice, as promised by a growing number of independent telephone companies, is within the range of these newer generations of twisted pair. Twisted pair will remain a viable local area network technology, particularly appealing and accessible (in terms of cost) to small companies.

The advantage of fiber optics is security. In areas where high security is the first priority, as in the Department of Defense, there is no other secure medium. It is virtually impossible to tap into fiber without being detected. The double edge is that fiber optics have not been installed widely to date due to the tapping difficulty. There is another, lesser known, benefit of fiber: fiber optics are the medium of choice in areas subject to high radiation emission, because fiber is virtually immune to the "noise" created by radiation. The irony of fiber is that although it has an inherently wide bandwidth, we have not yet been able to use that capacity effectively. Although the medium can handle GHz, we are relegated to operating on it at the MHz level because of our coupling limitations.

The air-based media provide mobility and accessibility which are not inherent in any of the fixed media. Radio waves, infrared, etc., may be the only way to communication with a field unit. The liability of the air-based media is that they are generally "line of sight" and they leave a wide footprint or window for being intercepted.

The coaxial cable alternatives are, at present, subordinate to the baseband/broadband issues. Beyond the exercise of the argument itself, the debunking of the baseband and broadband myths is essential to being able to make judicious network decisions. To that end, there follows a review list of the benefits and liabilities of each alternative.

## BASEBAND STRENGTHS

- Passive media.
- Simple connection.
- High-speed channel.
- Well specified.
- Easily installed and maintained.
- Digital technology appropriate for VLSI.
- Relatively low dollar cost per bit, per second.

## BASEBAND WEAKNESSES

- No multinode.
- Lower aggregate bandwidth.
- Grounding precautions.

## BROADBAND STRENGTHS

- Well-developed and tested (CATV) components.
- 300MHz available.
- Multiple segregated channels -- frequency division multiplexing (FDM).
- Independent channel protocols -- time division multiplexing (TDM).
- Isolation, grounding excellent.
- Established infrastructure to support cable plant.